

ESR24-047 - Modelling and evaluating Anthropogenic Mineral Resources in urban areas from geological, technological, and societal perspectives

Zusammenfassung

Most resources consumed and wastes generated by urban societies are construction minerals. Circularity of these is key for a sustainable urban development. This project develops a model based on mainly experimental data to locate, evaluate and classify anthropogenic mineral resources in urban areas for their use as recycling materials in a circular economy of construction minerals. Therefore, in the first step, an anthropo-geological mineral resource cadastre in the form of a geo information map of Vienna is developed, using existing big data sets. This map contains all relevant anthropogenic mineral resource flows and stocks like waste from excavation, construction and demolition, biomass and waste incineration. The big datasets are analyzed by artificial intelligence (AI). Then, in the second step, samples of the anthropogenic mineral resources are collected and used to experimentally produce recycling materials for different applications, in particular low-carbon cement and concrete, since these materials are major contributors to greenhouse gas emissions in the construction industry. In the third step, the secondary raw materials produced are experimentally tested and evaluated on their technical properties, environmental impacts, and life-cycle emissions and costs. In addition to that, a quantitative stakeholder analysis with the construction industry, authorities and civil society organizations, is carried out, in order to evaluate the socio-economic, socio-ecological, and socio-cultural aspects of this path to circularity. Based on the data, in the fourth and last step, an integrated model is developed for the evaluation and classification of anthropogenic mineral resources for circular construction. The model is in line with current EU initiatives, but represents a novelty in research due to its focus on construction minerals. The model helps major stakeholders in cities like Vienna in the transformation towards a circular low-carbon economy in construction.

Wissenschaftliche Disziplinen:

Environmental engineering (40%) | Engineering geology (30%) | Urban planning (30%)

Keywords:

Circular Economy Anthropogenic Resources Secondary Raw Materials Urban Planning Low-carbon Concrete Resource Evaluation Resource Classification

Principal Investigator: Jakob Lederer

Institution: TU Wien

Co-Principal Investigator(s): Konrad Bergmeister (BOKU - University of Natural Resources and Life Sciences)
Therese Schwarzboeck (TU Wien)

Status: Vertrag in Vorbereitung

Weiterführende Links zu den beteiligten Personen und zum Projekt finden Sie unter

<https://www.wwtf.at/funding/programmes/esr/ESR24-047/>